REMARKS

Claims 1, 2, 5-26 and 29-51 remain pending in the above-identified application and have been rejected. The drawings have been objected to. Claims 1, 25, 47, 48 and 51 have been amended.

Claims 1, 2, 5-26 and 29-51 stand rejected under 35 U.S.C. § 112, first paragraph as failing to describe the subject matter of these claims in the specification in such as to enable one skilled in the art to make and/or use the invention. Specifically, the Office action states that the specification does not provide sufficient guidance on how to fabricate a gas sensor having a catalytic gate-electrode deposited on a semiconductor surface, wherein the sensor is either a HFET, MISFET, MESFET, or MISHFET. Furthermore, the drawings have been objected to as not showing a gas sensor having a catalytic gate-electrode deposited on a semiconductor surface, wherein the sensor is either a HFET, MISFET, MESFET, or MISHFET. Claims 1, 25, 47, 48 and 51 have been amended. Applicant respectfully traverses the rejection and objection.

Claims 1, 25, 47 and 51 are each directed to a gas sensor device that includes, among other features, "one or more catalytic gate-electrodes contacting" a surface of a semiconductor layer. The recited gas sensor device is "selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET". Claims 2 and 5-24 depend from claim 1. Claims 26 and 29-46 depend from claim 25. Claim 48 is directed to a gas sensor device that includes, among other features, "an insulating layer" and "one or more catalytic gate-electrodes contacting a surface of said insulating layer". Claims 49 and 50 depend from claim 48.

Applicant respectfully submits that at least FIGS. 1 and 4 show a gas sensor having a catalytic gate-electrode contacting a surface of a semiconductor layer, wherein the sensor is either a HFET, MISFET, MESFET, MOSFET, or MISHFET. FIG. 1 illustrates a gas sensor device 10 in accordance with an embodiment of the invention. The catalytic gate-electrode 14 is shown directly disposed on a surface of the semiconductor 12. The gas sensor device shown in FIG. 1 may be a metal semiconductor field effect transistor, or MESFET. Alternatively, the gas sensor device 10

shown in FIG. 1 may be a heterostructure field effect transistor, or HFET. If the gas sensor device 10 is a HFET, the semiconductor 12 would include a heterostructure barrier layer, similar to the heterostructure barrier layer 52 illustrated in FIG. 4. Furthermore, applicant submits that at least FIG. 3 illustrates a MISFET gas sensor device in which a catalytic gate-electrode contacts an insulation layer 38, as recited in claim 48.

Since both a MISFET and a HFET gas sensor device, each having at least one catalytic gate-electrode contacting a surface of a semiconductor, are shown in the drawings, and since a MISFET gas sensor device with a catalytic gate-electrode contacting a surface of an insulation layer is also shown in the drawings, applicant submits that the specification and drawings as originally filed provide sufficient disclosure to enable one of ordinary skill in the art to make and/or use the invention recited in claims 1, 2, 5-26 and 29-51.

Claims 1, 2, 5, 6, 12-15, 17, 18, 20-22, 25, 26, 29, 30, 36-38, 40, 41 and 44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by von Windheim. Claims 1 and 25 have been amended. Applicant respectfully traverses the rejection.

The von Windheim reference refers only to diamond Schottky diodes and gas sensors fabricated therefrom. A review of von Windheim confirms that the only type of gas sensor described therein is a Schottky diode-based gas sensor. See, for example, Column 2, lines 32-33 ("It is therefore an object of the invention to provide a diamond Schottky diode").

Schottky diodes are neither HFETs, MISFETs, MESFETs, MOSFETs, or MISHFETs, and thus von Windheim fails to teach each and every element as recited in claims 1 and 25. Schottky diodes are vastly different from HFETs, MISFETs, MESFETs, MOSFETs, and MISHFETs. For example, a FET is controlled by a gate that is independent of conduction. A Schottky diode, to the contrary, is controlled by a gate which is inherently a part of the conduction process. At high temperatures, the conducting of a current through a Schottky diode device will cause the device to suffer degradation of the conduction path. Applicant respectfully submits that von Windheim fails to teach or suggest each and every feature recited in claims 1 and 25, and therefore, claims 1, 2, 5, 6, 12-15, 17, 18, 20-22, 25, 26, 29, 30, 36-38, 40, 41 and 44 cannot be anticipated by this reference.

Claims 1, 2, 5, 6, 13-15, 17, 20-22, 24, 48 and 49 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Baranzahi. Claims 1 and 48 have been amended. Applicant respectfully traverses the rejection.

As noted previously, claims 1 and 48 are each directed to a gas sensor device. The gas sensor device of claim 1 includes, among other features, "one or more catalytic gate-electrodes contacting" a surface of a semiconductor layer. The gas sensor device is "selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET". Claims 2, 5, 6, 13-15, 17, 20-22 and 24 depend from claim 1. The gas sensor device of claim 48 includes, among other features, "an insulating layer" and "one or more catalytic gate-electrodes contacting a surface of said insulating layer". Claim 49 depends from claim 48.

Baranzahi refers to a gas sensing device that includes a semiconductor 1, an insulator 2, a catalytic metal 3, an intermediate layer 4, and a catalytic layer 5. The catalytic layer 5 serves as a catalytic gate-electrode. The catalytic layer 5 does not contact a surface of the semiconductor 1, nor does the catalytic layer 5 contact the insulator 2. Therefore, Baranzahi fails to teach or suggest each and every element of claim 1 in that it fails to teach "one or more catalytic gate-electrodes contacting [a semiconductor layer] surface" and each and every element of claim 48 in that it fails to teach "one or more catalytic gate-electrodes contacting a surface of said insulating layer".

Claims 7-10 and 31-34 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim and Sibbald. Claims 7-10 depend from claim 1, while claims 31-34 depend from claim 25. Applicant respectfully traverses the rejection.

As noted previously, von Windheim fails to teach or suggest a "gas sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET" as recited in claims 1 and 25. Sibbald is relied upon in the Office action as teaching the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as a catalytically active metal. Sibbald provides no relevant teaching or suggestion regarding a "gas

sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET".

Claims 11 and 35 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim and Onaga. Claim 11 depends from claim 1, while claim 35 depends from claim 25. Applicant respectfully traverses the rejection.

The von Windheim reference, as noted previously, fails to teach or suggest a "gas sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET" as recited in claims 1 and 25. Onaga is relied upon in the Office action as teaching the use of $LaNiO_3$ as a metal oxide semiconductor. Onaga provides no relevant teaching or suggestion regarding a "gas sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET".

Claims 19, 42 and 47 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim and Najafi. Claim 19 depends from claim 1, claim 42 depends from claim 25, and claim 47 is independent in nature. Claim 47 has been amended and recites, in relevant part, a gas sensor device that is "selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET". Applicant respectfully traverses the rejection.

The von Windheim reference, as noted previously, fails to teach or suggest a "gas sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET" as recited in claims 1, 25 and 47. Najafi is relied upon in the Office action as teaching a flip-chip design for gas microsensors. Najafi provides no relevant teaching or suggestion regarding a "gas sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, MOSFET, and a MISHFET".

Claim 23 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim and Kang. Claim 23 depends from claim 1. Applicant respectfully traverses the rejection.

The von Windheim reference, as noted previously, fails to teach or suggest a "gas sensor device ... selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET" as recited in claim 1. Kang is relied upon in the Office action as teaching a FET sensor array. Due to the vast difference between Schottky diodes and FET sensor devices, capacitors, resistors, and diodes formed from layers of different dopings in a semiconductor device, there would have been no suggestion or motivation to one ordinarily skilled in the art to combine the teachings of von Windheim with those of Kang. Further, all of the FET arrangements disclosed in Kang include an electrode disposed on an insulating body, and not a surface of a semiconductor. Thus, both von Windheim and Kang fail to teach or suggest "one or more catalytic gate-electrodes contacting" a surface of a semiconductor layer as recited in claim 1.

Claims 16 and 51 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Baranzahi and Khan. Claim 16 depends from claim 1 and claim 51 is independent in nature. Claim 51 recites a gas sensor device that includes, among other features, "a semiconductor substrate having ... a surface" and "one or more catalytic gate-electrodes contacting said surface". Applicant respectfully traverses the rejection.

Baranzahi fails to teach or suggest "one or more catalytic gate-electrodes contacting [a semiconductor] surface" as recited in claims 1 and 51. Khan is relied upon in the Office action as teaching the use of a heterostructure AlGaN layer, and thus, provides no relevant teaching or suggestion pertaining to "one or more catalytic gate-electrodes contacting [a semiconductor] surface".

Claims 25, 26, 29, 30, 41, 43 and 46 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Baranzahi and von Windheim. Claims 26, 29, 30, 41, 43 and 46 depend from claim 25. Applicant respectfully traverses the rejection.

As noted previously, Baranzahi fails to teach or suggest "one or more catalytic gate-electrodes contacting [a semiconductor] surface" as recited in claim 25. Further, von Windheim fails to teach or suggest a gas sensor "selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, MOSFET, and a MISHFET" as recited in claim 25. Further, since the focus of von Windheim is Schottky diodes, there would have been no motivation or suggestion to combine the teachings of von Windheim with Baranzahi.

Claim 39 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Baranzahi, von Windheim and Khan. Claim 39 depends from claim 25. Applicant respectfully traverses this rejection.

As noted previously, Baranzahi fails to teach or suggest "one or more catalytic gate-electrodes contacting [a semiconductor] surface" as recited in claim 25. Further, von Windheim fails to teach or suggest a gas sensor "selected from the group consisting of a HFET, a MISFET having a silicon nitride passivation layer, a MESFET, a MOSFET, and a MISHFET" as recited in claim 25. Further, since the focus of von Windheim is Schottky diodes, there would have been no motivation or suggestion to combine the teachings of von Windheim with Baranzahi. Khan is relied upon in the Office action as teaching the use of a heterostructure AlGaN layer, and thus, provides no relevant teaching or suggestion to those of Baranzahi and von Windheim.

For at least the aforementioned reasons, applicant respectfully traverses the final rejection of claims 1, 2, 5-26 and 29-51. Withdrawal of the rejections is respectfully requested, and allowance of the claims is respectfully solicited.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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